INF 4300   2016

Exercises on shape representation

Problem 11.1 in G&W

Problem 11.8 in G&W

Problem 11.9 in G&W

Creating region objects using Matlab

In this practical exercise you will work your way through preprocessing, segmentation, creating region objects, and computing simple shape descriptiors.

1. Load the image 'tall_noise10_backgr.png' from
    www.uio.no/studier/emner/matnat/ifi/INF4300/h16/undervisningsmateriale/tall_noise10_backgr.png
    The image contains number on a noisy background. The background has both low frequent background variations and high frequent noise.
2. Try to filter out the high frequent noise using either a convolution low-pass filter or a median filter.
3. Thresholding the image using a global threshold does not work as the image has varying background. We can either compute the threshold in a local window, or estimate the background and subtract it from the image. Try estimating the background using either a mean filter or a median filter with a very large size (applied to the result from point 2). The filter size should be so large that the filtered image only shows the background, not the numbers.
4. Compute the difference between the filtered image and the noise-filtered from point 2. Is the result you got now suitable for global thresholding? Experiment with filter sizes.
5. Threshold the image using a global threshold.
6. Analyze how good the thresholding is : are the numbers connected? Do we have one connected component per number? What about the frame?
7. Compute region objects in matlab and create a region label image to study how the regions correspond to numbers
    ```
    b1 = bwlabel(bw);
    cc=bwconncomp(b1);
    ll = labelmatrix(cc);
    regim = label2rgb(ll);
    imshow(regim);
    ```
8. Compute simple region properties using regionprops in matlab. Can you use region area to remove the frame and noisy segments?
9. Create scatter plots between pairs of region properties using the function gscatter. Do you see what is noise or frame in the scatter plots?
    ```
    d=regionprops(b1,'area','boundingbox','ConvexArea'…….); %Add more
    properties, see doc regionprops
        feat1 = d.Area;
        feat2 = d.BoundingBox;
    ```

```
gscatter(feat1,feat2);
```

From 2011 Exam: Exercise 1: Chain Codes

You are given the 8-directional chain code and the two objects below.
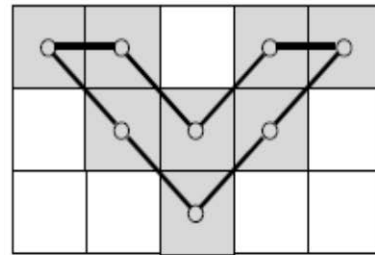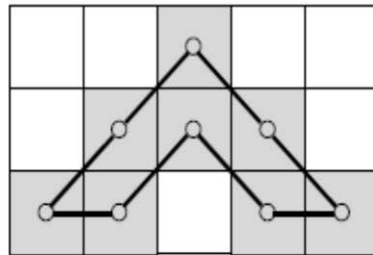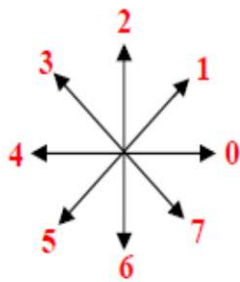
a) Chain code the boundary of the Λ-shaped object clockwise from the lower left pixel.

b) Which technique, based on the 8-directional <u>absolute</u> chain code, can be used to make a description of the Λ-shaped object that is independent of the start point? Demonstrate this by starting at the top pixel of the object, instead of the lower left.

c) The V- shaped object is a rotation of the Λ-shaped object.
Which technique, based on the clockwise <u>relative</u> chain code, will give you the same description of the two objects, independent of the start point?
Demonstrate this by starting at the upper left pixel of the V-shaped object.

From 2012 Exam: Exercise 1: Chain Codes

You are given the 8-directional chain code and the object below, where black is object pixels.
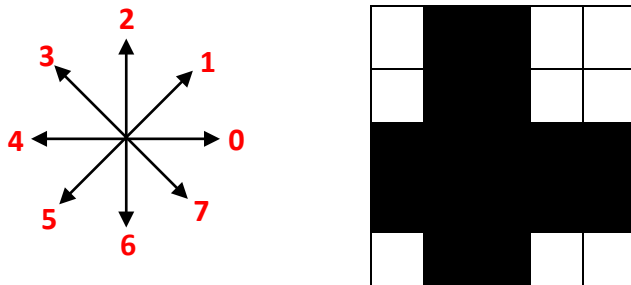
a) Chain code the boundary of the object clockwise from the upper left pixel.

b) Which technique will make the code invariant to the choice of start point?
   Demonstrate this by starting at lower right pixel of the object.

c) Which technique will make the code rotation invariant?
   Demonstrate this by rotating the object $\pi/2$ counterclockwise and start at one of the same object pixels as above.